

A Spinel Manganese Oxyiodide Cathode Synthesized by Hydrothermal Method for Secondary Batteries

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Spinel lithium-manganese-oxyiodide was firstly synthesized by hydrothermal method at 300°C low temperature. Furthermore, it exhibited good performance when used as lithium ion secondary batteries cathode materials. After 80 cycles, there was only a little capacity fade observed, which almost can be neglected. The prepared compound was determined as spinel structure by powder XRD and TEM image showed the compound particles were of regular crystal morphology.

1. Introduce

Lithium-manganese-oxyiodide¹ was firstly prepared by redox reaction, and used as cathode material it showed attractive electrochemical properties^{1,2}. Jaekook K. ascribed the properties to the larger iodine ion radius, which was helpful to larger capacity. That was to say, it supplied larger ions channel for intercalation and deintercalation of lithium ions. The compound was characterized as amorphous structure by powder XRD. Therefore, we prepared the spinel lithium-manganese-oxyiodide by means of hydrothermal method, and hoped to improve the electrochemical properties of LiMn₂O₄ through addition of iodine.

2. Experimental

Calculated Mn(NO₃)₂ · H₂O and LiOH were dissolved in deionized water in a 50 ml autoclave. Then 10 ml 45% HI solution was added into the autoclave. The mixture solution was placed in constant-box at 240 °C for 24 hours. And the precursor was deal with under infared lamp to drive H₂O off at about 100 °C. Finally it was calcined in muffle at 260 °C for 2 hours.

X-ray power diffraction (XRD) was carried out on a Rigaku D/max-rA with Cu Ka radiation and a graphite monochromator.

3. Results and disscution

The crystal structure of lithium-manganese-oxyiodide compounds was characterized by XRD, as shown in **Fig. 1**. It was found that all of the diffraction peaks are attributable to the spinel structure of LiMn₂O₄. We can conclude spinel lithium-manganese-oxyiodide can be easily synthesized by hydrothermal method.

Fig. 2 shows the cycle-capacity of spinel lithium-manganese-oxyiodide compounds. The spinel lithium-manganese-oxyiodide exhibits excellent stability, after cycling 80 times, the reversible capacity has not almost exhibited any loss, and the reversible capacity is still around 90mAh·g⁻¹. The results confirm the fact that the doped-iodine ion can improve the stability of LiMn₂O₄.

Fig. 1 XRD pattern of lithium-manganese-oxyiodide

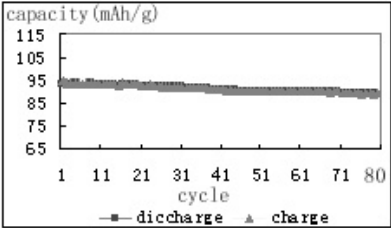


Fig. 2 Relation of charge-discharge capacity against cycles

4. Reference

1. Jaekook k., Arumugam M. Nature, 390, 1997, 265.
2. Liu Xinquan, Chen Zhaoyong, Yu Zuolong, Acta Chimica Acta, 58, 2000, 1090.

